

## Module 13 Lesson Plan

# Strategies for Controlled Access Highways



### Content

#### Essential Knowledge and Skills 24

- Introduction to Controlled Access Highways
- Characteristics of Controlled Access Highways
- Types of Controlled Access Highways
- Interchanges
- Safety Design Features
- Signs, Signals and Markings on Controlled Access Highways
- Entering a Controlled Access Highway
- Exiting a Controlled Access Highway
- Effect of Speed on Vision
- Lane Changes and Passing
- Managing Time and Space
- Responding to Congestion
- Risky Behaviors on Controlled Access Highways
- Assignment
- Assessment

## M13—Strategies for Controlled Access Highways

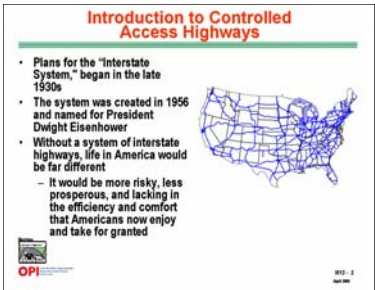
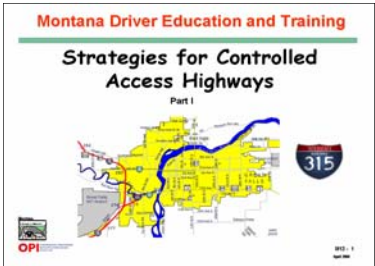


**Lesson Objective:** The student uses critical thinking skills to distinguish how driving conditions and characteristics on controlled and limited access highways are different from other driving environments and applies a time and space management system with vision, motion, and steering control for good driving habits on these types of highways.

Instructional Topic	Content	Slide
<b>INTRODUCTION TO CONTROLLED ACCESS HIGHWAYS</b>	<p>Planning for what is now known as the Dwight D. Eisenhower National System of Interstate and Defense Highways, commonly called "The Interstate System," began in the late 1930s</p> <p>A substantial portion of our nation's mobility is attributable to the Dwight D. Eisenhower System of Interstate and Defense Highways created in 1956</p> <ul style="list-style-type: none"> <li>The U.S. Interstate Highway System, the largest public works program in history, has had an enormous impact on the nation               <ul style="list-style-type: none"> <li>... Without a first class system of interstate highways, life in America would be far different—it would be more risky, less prosperous, and lacking in the efficiency and comfort that Americans now enjoy and take for granted</li> <li>... People would be crowded into more densely packed inner cities, intercity travel would occur less often and be more cumbersome; freight charges would be higher and, as a consequence, so would prices of goods and services</li> <li>... Vacation travel would be more restricted</li> </ul> </li> </ul>	T13-1
	<ul style="list-style-type: none"> <li>The U.S. Interstate Highway System has enriched the quality of life for virtually every American; it has:               <ul style="list-style-type: none"> <li>... saved the lives of at least 187,000 people</li> <li>... prevented injuries to nearly 12 million people</li> <li>... returned more than \$6 in economic productivity for each \$1 it cost</li> <li>... positioned the nation for improved international competitiveness</li> <li>... permitted the cherished freedom of personal mobility to flourish</li> <li>... enhanced international security</li> </ul> </li> <li>In large measure, the Interstate Highway System has democratized mobility in the United States, providing virtually all Americans with the ability to move quickly to any destination within their communities and to travel throughout the nation, inexpensively, and at whatever time or date they desire</li> </ul> <p>Source: American Highway Users Alliance, <i>The US Interstate Highway System: 40 Year Report</i>, June 1996            Source: <a href="http://safety.fhwa.dot.gov">http://safety.fhwa.dot.gov</a>            Interstate System Mileage (as of October 31, 2002) = 46,726 miles</p>	T13-2

Student Learning Activities

Resources



M13

Instructional Topic	Content	Slide
<b>CHARACTERISTICS OF CONTROLLED ACCESS HIGHWAYS</b>	Introduce, model, practice and discuss The words "limited" and "controlled" access highways are interchangeable with "freeways" and "expressways"	T13-3
	<ul style="list-style-type: none"> <li>• Travel on these highways is limited to motor vehicles</li> <li>• Drivers have minimum and maximum speed limits</li> <li>• Opposing traffic has some type of barrier (median grass strip, guardrail, concrete wall, etc.)</li> </ul>	T13-4
	... Multiple lanes in both directions ... Designed to carry lots of traffic quickly and efficiently <ul style="list-style-type: none"> <li>• Controlled access highways are limited as to where drivers can enter and exit</li> <li>... Distance between entrance and exit locations may only be a mile apart or many miles apart</li> <li>• There is a high injury severity rate when a collision occurs because of the higher speeds</li> <li>... On Montana's interstates, 2,460 collisions occurred during 2004 causing 38 fatalities</li> </ul>	T13-5
	<ul style="list-style-type: none"> <li>◆ Emergency Crossovers</li> </ul> Emergency crossovers on limited access roadways are restricted to emergency or law enforcement vehicles only ... Driving in these restricted areas can result in a large fine	T13-6
◆ Tollbooths	Drivers must stop and pay to drive on some highways and turnpikes <ul style="list-style-type: none"> <li>• Search well ahead for tollbooth signs</li> <li>• There are three types of tollbooths:               <ol style="list-style-type: none"> <li>1. Automatic—the driver deposits coins into a machine, requiring the exact change before entering this tollbooth</li> <li>2. Attendant Operated—for drivers without exact change or large/oversized vehicles</li> <li>3. Electronic—an electronic device is placed in the drivers vehicle As the driver approaches the tollbooth, the device communicates with a computer that subtracts the amount electronically from a pre-paid account</li> </ol> </li> <li>• Watch for overhead signs that identify which lanes are open and if exact change, a pass card, or an attendant is used to get through the tollbooth</li> <li>• Begin reducing speed early for toll booths as traffic may be backed up at the booth</li> <li>• Search for green lights or signs for an open booth, select the preferred lane and stay in the chosen lane ... Many crashes at tollbooths are caused by drivers quickly changing lanes to try and get in a shorter lane</li> <li>• When exiting the toll area, search traffic to both sides for merging potential ... Accelerate smoothly and adjust speed</li> </ul>	T13-7

# Student Learning Activities

# Resources



## Characteristics

- The words "limited" and "controlled" access highways are interchangeable with "freeways" and "expressways"
  - Travel on these highways is limited to motor vehicles
  - Drivers are limited as to where they can enter and exit
- Drivers have minimum and maximum speed limits
- Opposing traffic has some type of barrier (median grass strip, guardrail, concrete wall, etc.)
- There are multiple lanes in both directions
- They are designed to carry lots of traffic quickly and efficiently
- Distance between entrance and exit locations may only be a mile apart or many miles apart



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April 2005

## Characteristics

- The U.S. Interstate Highway System has enriched the quality of life for virtually every American
  - It provides virtually all Americans with the ability to move quickly to any destination within their communities and to travel throughout the nation, inexpensively, and at whatever time or date they desire



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## Characteristics

- There is a high injury severity rate when a collision occurs because of the higher speeds
- On Montana's interstates, 2,460 collisions occurred during 2004 causing 38 fatalities



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## Emergency Crossovers

- Emergency crossovers on limited access roadways are restricted to emergency or law enforcement vehicles only
- Driving in these restricted areas can result in a large fine



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## Toll Booths

There are three types of tollbooths:

1. **Automatic** — the driver deposits coins into a machine, requiring the exact change before entering the tollbooth
2. **Attendant Operated** — for drivers without exact change or large/oversized vehicles
3. **Electronic** — an electronic device is placed in the driver's vehicle, as the driver approaches the tollbooth, the device communicates with a computer that subtracts the amount electronically from a pre-paid account



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M13

Instructional Topic	Content	Slide
◆ Toll Roads and Bridges	<p>From 1864 to 1872, Montana was completely dependent on toll roads and bridges</p> <ul style="list-style-type: none"> <li>• The first territorial legislatures did not have funds to develop a road system in Montana , so they chartered toll companies to build and maintain roads and bridges</li> <li>• There were so many toll roads and bridges, however, that freighters and other travelers began complaining loudly to the legislature that tolls were seriously eating into their profits</li> <li>• The system was abolished in 1872</li> <li>• Yankee Jim's National Park Toll Road in Park County was the last toll road</li> <li>• The Snowden Bridge over the Missouri River charged tolls until 1956</li> <li>• Roads and bridges are generally paid for with fuel taxes</li> </ul>	T13-8
◆ HOV Lanes	<p>High-Occupancy Vehicle (HOV) lanes allow vehicles with two or more people to use diamond and express lanes</p> <ul style="list-style-type: none"> <li>• The goal of HOV lanes is to use the current freeway system more efficiently and to provide a quicker, more reliable trip to those who car pool</li> </ul>	T13-9
◆ Advantages of Controlled Access Highways	<p>Controlled access highways have advantages</p> <ul style="list-style-type: none"> <li>• Collision and fatality rates are lower than on other types of roadways, but often have a high injury severity rate when a collision occurs because of the higher speeds</li> <li>• Cross traffic is not present because of controlled interchanges</li> <li>• Opposing traffic is separated by a barrier</li> <li>• Pedestrians, bicyclists, and slow-moving vehicles are not permitted on expressways</li> <li>• These roadways are designed to help drivers anticipate conditions ahead</li> <li>• There are no stops or cross traffic, so drivers can travel long distances without stopping</li> <li>• Signs are large and placed well in advance of exits, major interchanges, etc.</li> <li>• Higher speed limits allow for fast, efficient travel</li> </ul> <p>A driver with no experience driving on limited access highways should build experience gradually</p>	T13-10
◆ Disadvantages of Controlled Access Highways	<p>Drivers can manage their risk by being aware of the disadvantages</p> <ul style="list-style-type: none"> <li>• Multiple lanes make lane selection critical</li> <li>• Stopping distances are increased with higher speeds</li> <li>• Trucks, tractor-trailers, buses, recreational vehicles, and other large or slow moving vehicles add additional challenges to driving on multiple-lane roads               <ul style="list-style-type: none"> <li>... They are especially a concern when driving on hills where large vehicle speeds are not consistent with other vehicles</li> <li>... Larger vehicles may provide a wind blast that can move smaller vehicles when passing</li> <li>... They can encourage boredom and fatigue resulting in drowsiness and falling asleep</li> </ul> </li> <li>• Higher speeds can make small driving errors disastrous               <ul style="list-style-type: none"> <li>... Crashes are more serious because of higher speeds</li> </ul> </li> <li>• Rush hour traffic can create congestion and increase commute time</li> </ul>	T13-11

# Student Learning Activities

## Resources



### Toll Roads and Bridges

- Roads and bridges are generally paid for with fuel taxes
- From 1864 to 1872 Montana was completely dependent on toll roads and bridges
- Montana chartered toll companies to build and maintain roads and bridges
- There were so many toll roads and bridges, legislature received complaints that tolls were seriously eating into their profits
- The system was abolished in 1872
- Yankee Jim's National Park Toll Road in Park County was the last toll road in Montana



The Snowden Bridge over the Missouri River charged tolls until 1956



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### HOV Lanes

- High-Occupancy Vehicle (HOV) lanes allow vehicles with two or more people to use diamond and express lanes
- The goal of HOV lanes is to use the current freeway system more efficiently and to provide a quicker, more reliable trip to those who car pool



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### ADVANTAGES OF LIMITED ACCESS ROADS

- Collision and fatality rates are lower
- Cross traffic is not present
- Opposing traffic is separated by a barrier
- There are no stops
- Signs are large and placed well in advance
- Higher speed limits allow for fast, efficient travel



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### DISADVANTAGES OF CONTROLLED ACCESS HIGHWAYS

- Lane selection is critical
- Increased stopping distance
- Small driving errors can be disastrous
- Different size and weight of vehicles adds additional challenges
- Rush hour congestion



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M13

Instructional Topic	Content	Slide
◆ Highway Hypnosis	<p><u>Highway Hypnosis</u> When driving over a long period of time, particularly on a rural expressway with little traffic, "highway hypnosis" can occur</p> <ul style="list-style-type: none"> <li>... The driver may become hypnotized by constantly staring ahead on the roadway, which may result in driving in a dulled, drowsy, trance-like condition</li> <li>• To avoid this dangerous condition:               <ul style="list-style-type: none"> <li>... Switch drivers often</li> <li>... Plan breaks and rest stops to combat highway hypnosis</li> <li>... Pull over to a safe area for rest and sleep when tired (not on the shoulder of the road)</li> </ul> </li> </ul>	T13-12
◆ Velocitation	<p><u>Velocitation</u> Unknowingly accelerating to a higher speed while driving is known as velocitation</p> <ul style="list-style-type: none"> <li>... When driving at faster speeds for a period of time the body adjusts and causes the driver to think the vehicle is going slower than it actually is</li> <li>• Drivers may experience velocitation when they leave a high-speed expressway to enter surface streets and don't recognize the need to reduce speed to the lower speed limit</li> <li>• To avoid this problem:               <ul style="list-style-type: none"> <li>... Check the ramp speed limit when exiting the freeway</li> <li>... Check the car's speed</li> <li>... Recognize it will take time for the body to adjust to the slower speed</li> </ul> </li> </ul>	T13-13
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <b>TYPES OF CONTROLLED ACCESS HIGHWAYS</b> </div>	<p>Introduce, model, practice and discuss</p> <p><u>Expressway</u> High-speed divided highway with more than one lane running in each direction</p> <p><u>Freeway/ Superhighway</u> Same as an expressway, but usually refers to highways without tolls</p> <p><u>Turnpike/ Tollroad/Tollway</u> Usually an expressway that drivers pay to use</p> <p><u>Beltway</u> A limited access highway that goes around a city/urban area</p> <p><u>Parkway</u> Wide landscaped divided highway, possibly limited to non-commercial vehicles</p> <ul style="list-style-type: none"> <li>• Generally there are few if any commercial businesses or offices on parkways</li> </ul>	T13-14



# Student Learning Activities

# Resources



## Highway Hypnosis

- A dull or drowsy condition that can occur because of the concentration needed while driving long distances
- It becomes worse when the driver's eyes focus on the yellow line



- Plan breaks and rest stops to combat highway hypnosis
- Pull to a safe area for rest and sleep when tired



M13 - 12  
April 2008

## Velocitation

- Unknowingly accelerating to a higher speed while driving is known as velocitation
- When driving at faster speeds for a period of time the body adjusts and causes the driver to think the vehicle is going slower than it actually is



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April 2008

## TYPES OF CONTROLLED ACCESS ROADS

### Expressway

- High-speed divided highway with more than one lane running in each direction

### Freeway/ Superhighway

- Same as an expressway, but usually refers to highways without tolls

### Turnpike/ Tollroad/ Tollway

- Usually an expressway that drivers pay to use

### Beltway

- A limited access highway that goes around a city/urban area

### Parkway

- Wide landscaped divided highway, possibly limited to non-commercial vehicles
- Generally there are few if any commercial businesses or offices on parkways



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April 2008

M13

Instructional Topic	Content	Slide
<b>INTERCHANGES</b>	<p>Introduce, model, practice and discuss</p> <p>Interchanges are locations where highways cross over or under each other so that drivers can enter or leave a limited access highway or connect to a highway going in a different direction</p>	
<p>◆ Cloverleaf Interchange</p>	<p><u>Cloverleaf Interchange</u></p> <p>Allows for interchange of two expressways or major roadways</p> <ul style="list-style-type: none"> <li>• The cloverleaf usually has entrance and exit weave lanes, since traffic leaves one roadway and enters from another roadway</li> <li>• Curved roadways have banked and flat exits, which can lead to braking and steering problems as drivers adjust from high speed to the speed of the exit curve</li> </ul> <p>Advantage:</p> <ul style="list-style-type: none"> <li>• Allows minimal disruption of speed or movement</li> </ul>	T13-15
<p>◆ Diamond Interchange</p>	<p><u>Diamond Interchange</u></p> <p>Allows for interchange of a major roadway with a secondary dual or multiple lane roadway</p> <ul style="list-style-type: none"> <li>• Intersects with roadways with low traffic volumes</li> <li>• May have traffic control devices on the intersecting secondary roadway, which allows for left and right turns onto the secondary roadway</li> </ul> <p>Advantages:</p> <ul style="list-style-type: none"> <li>• Quick, easy access to both roadways</li> </ul> <p>Disadvantage:</p> <ul style="list-style-type: none"> <li>• Little room available for left turns onto freeway</li> <li>• Traffic can build up on the ramps creating congestion</li> </ul>	T13-16
<p>◆ Trumpet Interchange</p>	<p><u>Trumpet Interchange</u></p> <ul style="list-style-type: none"> <li>• These intersections are often found when interstate feeder roads stop at the interstate roadway or loop</li> </ul> <p>Advantages:</p> <ul style="list-style-type: none"> <li>• Allows for interchange of secondary two-way streets to a multiple lane roadway with minimal traffic mix</li> </ul>	T13-17

Student Learning Activities

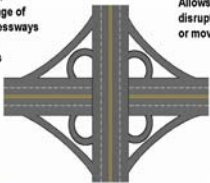
Resources



**CLOVERLEAF INTERCHANGE**

Allows for interchange of two expressways or major roadways

Allows minimal disruption of speed or movement



OPI

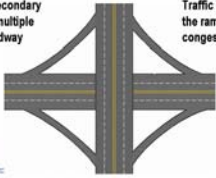
013 - 16 April 1998

**DIAMOND INTERCHANGE**

Allows for interchange of a major roadway with a secondary dual or multiple lane roadway

Little room available for left turns onto freeway

Traffic can build up on the ramps creating congestion



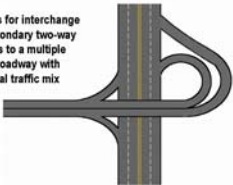
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013 - 16 April 1998

M13

**TRUMPET INTERCHANGE**

Allows for interchange of secondary two-way streets to a multiple lane roadway with minimal traffic mix



OPI

013 - 17 April 1998

Instructional Topic	Content	Slide
<p>◆ Frontage Road Interchanges</p>	<p><u>Frontage Road Interchanges</u> Allows for interchange of vehicles using parallel secondary two-way or one-way roadways and a major multiple-lane roadway</p> <p>Advantages: Frontage road turnarounds allow drivers to exit a multiple-lane roadway and use the opposing frontage road to enter the multi-lane roadway in the opposite direction</p>	T13-18
<p><b>SAFETY DESIGN FEATURES</b></p>	<p>Introduce, model, practice and discuss Limited Access Highways have built-in safety features</p> <ul style="list-style-type: none"> <li>• Cross traffic is eliminated</li> <li>• Limited entrances and exits in specific places</li> <li>• One-way traffic flowing in opposite directions separated by median strip or barriers</li> <li>• Pedestrians, animals, non-motorized vehicles, and slow moving vehicles are prohibited; fences restrict pedestrian and animal traffic</li> <li>• Wide shoulders and underpasses; wide shoulders may be used as an emergency lane for disabled vehicles</li> <li>• Curves are banked to improve visibility and vehicle control</li> <li>• Signs are placed well off the roadway and designed to help drivers anticipate conditions sooner</li> <li>• Sharp curves and steep grades are reduced or eliminated</li> </ul> <p>◆ Rumble strips</p> <p>Rumble strips are corrugated road sections used to alert the driver through the noise tires make when driven over them</p> <ul style="list-style-type: none"> <li>• They warn of hazards such as major or dangerous interchanges, or approaches to a tollbooth plaza</li> <li>• On some controlled access highways, rumble strips are located on the shoulder of the road to the right or left of the fog line to alert the driver that they are leaving the marked roadway lane</li> </ul> <p>◆ Breakaway Supports</p> <p>Breakaway support on signs and light poles are designed to break when struck by a vehicle, lessening the damage to the vehicle and injury to the occupants</p> <p>◆ Guardrails</p> <p>Guardrails prevent vehicles that leave the roadway from impact with retaining walls, fences, or other vehicles</p> <p>◆ Crash Barrels</p> <p>Crash barrels lessen the impact if a vehicle collides with a bridge or overpass support</p>	<p>T13-19</p> <p>T13-20</p> <p>T13-21</p>

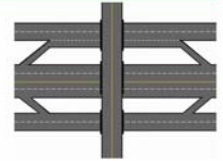
# Student Learning Activities

## Resources



### FRONTAGE ROAD INTERCHANGE

Allows for interchange of vehicles using parallel secondary two-way or one-way roadways and a major multiple-lane roadway



Allows drivers to exit a multiple-lane roadway and use the opposing frontage road to enter the multi-lane roadway in the opposite direction



M13 - 14  
April 2005

### SAFETY DESIGNS



- Pedestrians, animals, non-motorized vehicles, and slow moving vehicles are prohibited
- Fences restrict pedestrian and animal traffic
- Wide shoulders and underpasses
- Curves are banked
- Sharp curves and steep grades are reduced or eliminated



M13 - 15  
April 2005

### SAFETY DESIGNS

- **Breakaway support** on signs and light poles are designed to break when struck by a vehicle
  - Lessening the damage to the vehicle and injury to the occupants



- **Rumble Strips** are corrugated road sections used to alert the driver through the noise tires make when driven over them
  - Warn of approaching hazards
  - Alert the driver that they are leaving the lane



M13 - 16  
April 2005

### SAFETY DESIGNS

- **Guardrails** prevent vehicles that leave the roadway from impact with retaining walls, fences, or other vehicles
- **Crash barrels** lessen the impact if a vehicle collides with a bridge or overpass support



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April 2005

M13

Instructional Topic	Content	Slide
<p>◆ Motorist Information</p>	<p>Drivers often have information relayed to them during unusually heavy traffic</p> <ul style="list-style-type: none"> <li>• Changeable message signs warn drivers of traffic accidents, stalled vehicles, or other traffic problems               <ul style="list-style-type: none"> <li>... Information provided on traffic flow conditions</li> <li>... Drivers advised if they need to slow down and leave the freeway, or avoid it altogether</li> <li>... Indicate lane use control signals</li> <li>... May be used on freeways to warn drivers of dangerous conditions in the lane they are using</li> <li>... Also used to keep drivers out of lanes blocked by accidents, stalled vehicles, road work, or other problems</li> </ul> </li> <li>• Traffic signs are used in some areas to give information on traffic flow conditions on the next section of freeway</li> </ul>	T13-22
<p>◆ Runaway Truck Ramps</p>	<p>Runaway truck ramps are on downhill grades for use by large, semi-tractor trailers that have lost brake power and are unable to stop</p>	T13-23
<p><b>SIGNS, SIGNALS AND MARKINGS ON CONTROLLED ACCESS HIGHWAYS</b></p>	<p>Introduce, model, practice and discuss</p> <p>The “Interstate” sign is shaped like a shield and is red, white, and blue in color</p> <ul style="list-style-type: none"> <li>• Not all states add the state name to the sign</li> <li>• Signs may be located beside the roadway or hanging overhead on cross-posts</li> </ul>	
<p>◆ The Interstate Sign</p>	<p>Montana Interstates and their distance through Montana:</p> <ul style="list-style-type: none"> <li>• I-90 is 552 miles</li> <li>• I-15 is 396 miles</li> <li>• I-94 is 249 miles</li> <li>• I-115 (goes into Butte) and I-315 (goes into Great Falls) are less than two miles each</li> </ul>	T13-24

## Student Learning Activities

## Resources



### SAFETY DESIGNS

- **Changeable message signs** warn drivers of traffic accidents, stalled vehicles, or other traffic problems



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### SAFETY DESIGNS

- Runaway truck ramps are on downhill grades for use by large, semi-tractor trailers that have lost brake power and are unable to stop



M13 - 23  
April 2009

**M13**

### INTERSTATES IN MONTANA

- Montana Interstates and their distance through Montana:
  - I-90 is 552 miles
  - I-15 is 396 miles
  - I-94 is 249 miles
- I-115 (goes into Butte) and I-315 (goes into Great Falls) are less than two miles each



M13 - 24  
April 2009

Instructional Topic	Content	Slide
◆ The Interstate Sign (Cont.)	Interstate numbering nationwide follows a pattern:	T13-25
	<ul style="list-style-type: none"> <li>• Even numbers travel east-west (I-90, I-94)</li> </ul>	T13-26
	<ul style="list-style-type: none"> <li>• Odd numbers travel north-south (I-15)</li> </ul>	T13-27
	<ul style="list-style-type: none"> <li>• Numbers increase gradually from low to high               <ul style="list-style-type: none"> <li>... Numbers begin in the west and get larger as they move east</li> </ul> </li> <li>• Alternate routes are usually three-digit               <ul style="list-style-type: none"> <li>... If the first digit is even, the alternate route goes around the city</li> <li>... If it is odd, it leads into the city (I-115, I-315)</li> <li>... Montana's I-315 in Great Falls is 0.82 miles and is the second shortest highway in the nation</li> </ul> </li> </ul>	T13-28
	<ul style="list-style-type: none"> <li>• Since not all Interstates run due east-west or north-south, the closest cardinal direction that applies to most of the road is used               <ul style="list-style-type: none"> <li>... If a stretch of an east-west Interstate shifts to the south for a while, it is still considered an east-west highway</li> </ul> </li> </ul>	
◆ Traffic Signals	Traffic signals on expressways are rare	T13-29
	<ul style="list-style-type: none"> <li>• The most common use is to identify traffic lanes</li> <li>• A green arrow over a lane means that the lane is open for travel               <ul style="list-style-type: none"> <li>A yellow "X" over a lane means travel in that lane is about to change or close</li> <li>... The driver should move at least one lane to the right when safe to do so</li> </ul> </li> <li>• A red "X" over lane means travel in that lane is closed or prohibited</li> </ul>	T13-30
◆ Lane Markings	Lane markings on expressways mean the same as on any other roadway <ul style="list-style-type: none"> <li>• HOV (High Occupancy Vehicle) lanes are marked with a white diamond</li> </ul>	T13-31
◆ Speed Limits	The speed limit on limited access highways in Montana is 75 mph outside urban areas of 50,000 population and 65 mph within urban areas of 50,000 population <ul style="list-style-type: none"> <li>• These fixed speed limits are based on optimal road/weather conditions</li> </ul>	T13-32
◆ Mile Markers	Small markers along the side of Interstate highways and some other roads are usually green or white and have the word MILE along with a number; some just have the number	T13-33
	<ul style="list-style-type: none"> <li>• Mile markers show the number of miles from where the Interstate route entered a state               <ul style="list-style-type: none"> <li>... The counting always begins at the state line in the south (for north-south routes) and in the west (for east-west routes)</li> <li>... Mile marker numbers always get larger as drivers travel east or north</li> </ul> </li> </ul>	T13-34

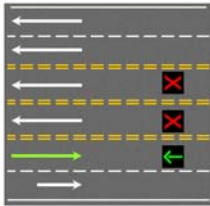


# Student Learning Activities

# Resources



## TRAFFIC SIGNALS


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## Lane Markings

- Lane markings on expressways mean the same as on any other roadway
- The HOV marking is unique to high occupant vehicles


M13 - 31  
April 2005

## SPEED LIMITS

- The speed limit on limited access highways in Montana is 75 mph outside urban areas of 50,000 population and 55 mph within urban areas of 50,000 population
- These fixed speed limits are based on optimal road/weather conditions

The SPEED LIMIT on Montana interstate highways is 75 miles per hour day and night except near large cities.

Automobiles	
Interstate 4 lane (four-lane)	75
Interstate 4 lane (urban)	65
Main interstate	75 night 65
Highway 93	65 at all times



Source: Montana State Road

M13 - 32  
April 2005

## MILE MARKERS

- Usually green or white and have the word MILE along with a number - some just have the number
- Mile markers show the number of miles from where the Interstate route entered a state
- The counting always begins at the state line in the south (for north-south routes) and in the west (for east-west routes)
- Mile marker numbers always get larger as drivers travel east or north


M13 - 33  
April 2005

## MILE MARKERS

- Knowing how to read mile markers can help drivers know exactly where they are in their destination
- Watching these numbers will be useful if a driver needs to call for assistance by giving an exact location
- Exit numbers will be the same number as the mile marker as shown in the two pictures
- Mile markers on roads off the Interstate system exist, however, the numbering system may be different from state to state—or even county to county


M13 - 34  
April 2005

## INTERSTATE SIGNS

### Interstate sign



### Guide sign



### Warning sign



### Speed limit


M13 - 35  
April 2005

## INTERSTATE HIGHWAY NUMBERS

- Even numbers go east-west (I-90, I-94)
- Odd numbers go north-south (I-15)
- Numbers begin in the west and get larger as they move east
- Alternate routes are usually three-digit


M13 - 36  
April 2005

## INTERSTATE HIGHWAY NUMBERS

- If the first digit is even, the alternate route goes around the city
- If it is odd, it leads into the city (I-115, I-315)


M13 - 37  
April 2005


- Montana's I-315 in Great Falls is 0.82 miles and is the second shortest highway in the nation


M13 - 38  
April 2005

## TRAFFIC SIGNALS

- Traffic signals on expressways are rare
- The most common use is to identify traffic lanes



Open for travel



Lane about to change or close



Closed Prohibited


M13 - 39  
April 2005

M13

Instructional Topic	Content	Slide
<p>◆ Mile Markers (Cont.)</p>	<ul style="list-style-type: none"> <li>• For example, when entering North Carolina from South Carolina traveling on I-95, the mile markers begin with "Mile 1" and get larger going north through the state; at the state line into Virginia, "Mile 1" begins again</li> <li>• When a major highway or Interstate originates inside a state, the numbering begins (south-to-north or west-to-east) from the junction where the road begins</li> <li>• Knowing how to read mile markers can help drivers               <ul style="list-style-type: none"> <li>... Know exactly where they are located</li> <li>... Determine how far it is to the destination</li> <li>... Do planning before a trip</li> <li>... Give an exact location if roadside assistance is needed</li> </ul> </li> <li>• Mile markers on roads off the Interstate system exist but the markers and the numbering systems may be different from state to state—or even county to county               <ul style="list-style-type: none"> <li>... Watching these numbers will be useful if a driver needs to call for assistance</li> </ul> </li> </ul>	T13-35
<p><b>ENTERING A CONTROLLED ACCESS HIGHWAY</b></p>	<p>Introduce, model, practice and discuss</p> <p>There are three parts to entering a controlled access roadway:</p> <ol style="list-style-type: none"> <li>1. entrance ramp,</li> <li>2. acceleration lane, and</li> <li>3. merge lane</li> </ol>	T13-36
<p>◆ 1. Entrance Ramp</p>	<p><u>1. Entrance Ramp</u></p> <ul style="list-style-type: none"> <li>• Before entering the entrance on ramp, search guide signs for the correct route number and direction or destination               <ul style="list-style-type: none"> <li>... If after entering the entrance ramp and seeing red and white signs "DO NOT ENTER" or "WRONG WAY," immediately pull over to the edge and seek an opportunity to get off the ramp; do not enter the highway against the flow of traffic</li> </ul> </li> <li>• The entrance ramp allows the driver time to search for traffic gaps and evaluate speed and space needed before merging into traffic</li> <li>• Ramps may be uphill, downhill, or level with the expressway</li> <li>• Some entrance ramps are entered from the left instead of the right               <ul style="list-style-type: none"> <li>... This means that traffic enters in the far-left lane, usually reserved for higher speed traffic</li> <li>... The potential for vehicle merging problems is much greater</li> <li>... When entering the expressway from the left, the search pattern is to the right and over the right shoulder instead of the left shoulder</li> <li>... Additional lane changes to the right may be necessary once on the expressway if the driver's desired speed is slower than traffic traveling in the left lane of the expressway which is usually faster</li> </ul> </li> </ul>	T13-37

## Student Learning Activities

## Resources



Montana Driver Education and Training

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Strategies for Controlled Access Highways  
Part II

OPI

9121 - 26  
April 2009

THREE PARTS TO ENTERING

1. Entrance ramp
2. Acceleration lane
3. Merge lane

OPI

9121 - 28  
April 2009

1. ENTRANCE RAMPS

- The entrance ramp allows the driver time to search for traffic gaps and evaluate speed and space needed before merging into traffic
- Ramps may be uphill, downhill, or level with the expressway
- Some entrance ramps are entered from the left instead of the right

OPI

9121 - 27  
April 2009

M13

Instructional Topic	Content	Slide
—Good Habits Using the Entrance Ramp	<u>Good habits include:</u> <ul style="list-style-type: none"> <li>• Make sure the entrance ramp is the correct one</li> <li>• Watch for “Do Not Enter” or “Wrong Way” signs</li> <li>• Check front and rear zones</li> <li>• Two lanes may enter at the same time requiring a merge with another lane while on the entrance ramp               <ul style="list-style-type: none"> <li>... This can be very dangerous, especially if the ramp is banked</li> </ul> </li> <li>• Observe traffic conditions on the limited access roadway</li> <li>• Search for and select a safe gap</li> <li>• Signal, check mirrors and blind spots</li> <li>• Prepare to adjust speed for heavy traffic on the ramp</li> <li>• Avoid stopping or backing up on a ramp</li> <li>• Prepare to drive onto the shoulder if traffic becomes blocked</li> </ul>	T13-38
—Entrance Problems	<u>Entrance Problems</u> <ul style="list-style-type: none"> <li>• General problems associated with expressway entrances include heavy traffic, short ramps and acceleration lanes, and high walls that may block visibility               <ul style="list-style-type: none"> <li>... Traffic ahead on the ramp may slow or stop abruptly</li> <li>... Sharp curves on the ramp could restrict visibility</li> </ul> </li> </ul>	T13-39
—Ramp Meters	<u>Ramp Meters</u> <ul style="list-style-type: none"> <li>• In heavily traveled areas traffic entering the expressway may be controlled with a system of lights and sensors</li> <li>• Traffic lights at the end of the entrance ramp are designed to distribute traffic onto the freeways when traffic is heavy               <ul style="list-style-type: none"> <li>... Permits one car at a time to enter the expressway; some ramps have two lanes permitting two cars to move onto the expressway</li> <li>... Look for a signal light on the entrance ramp and be prepared to stop if it turns red</li> </ul> </li> </ul>	T13-40
◆ 2. Acceleration Lane	<u>2. Acceleration Lane</u> <ul style="list-style-type: none"> <li>• This is the area to speed up to or near the speed of traffic on the expressway               <ul style="list-style-type: none"> <li>... The amount of acceleration depends on traffic flow</li> <li>... This lane is where the driver can increase speed to merge into the selected gap</li> </ul> </li> </ul>	T13-41
	<ul style="list-style-type: none"> <li>• The acceleration lane is often identified by a solid white line followed by short dashed white lines               <ul style="list-style-type: none"> <li>... The dashed lines extend to where the acceleration lane merges with the expressway</li> </ul> </li> </ul>	T13-42
	<ul style="list-style-type: none"> <li>• Wait for a large gap, signal, accelerate quickly to merge with the flow of traffic</li> </ul>	T13-43

# Student Learning Activities

# Resources



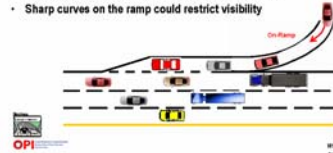
## ENTRANCE RAMP GOOD HABITS

- Make sure the entrance ramp is the correct one
- Watch for "Do Not Enter" or "Wrong Way" signs
- Check front and rear zones
- Two lanes may enter at the same time requiring a merge with another lane while on the entrance ramp
  - This can be very dangerous, especially if the ramp is banked
- Observe traffic conditions on the limited access roadway
- Search for and select a safe gap
- Signal, check mirrors and blind spots
- Prepare to adjust speed for heavy traffic on the ramp
- Avoid stopping or backing up on a ramp


M13 - 38  
April 2005

## ENTRANCE RAMP PROBLEMS

- General problems associated with expressway entrances include heavy traffic, short ramps and acceleration lanes, and high walls that may block visibility
- Traffic ahead on the ramp may slow or stop abruptly
- Sharp curves on the ramp could restrict visibility


M13 - 39  
April 2005

## RAMP METERS

- Traffic lights at the end of the entrance ramp are designed to distribute traffic onto the freeways when traffic is heavy
- Permits one car at a time to enter the expressway; some ramps have two lanes

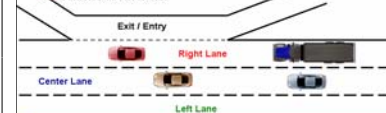


Be prepared to stop if the light turns red


M13 - 40  
April 2005

## LANE USAGE

- Right Lane:**
  - > Heavier and slower vehicles
  - > Vehicles about to exit
- Center Lane:**
  - > Long distance or passing


M13 - 41  
April 2005

## 2. ACCELERATION LANE

- Look and find a gap in traffic
- Try not to stop on an acceleration lane
- If unavoidable: flash brake lights, pull to the shoulder at the end of the acceleration lane or merge area, wait for a large gap, signal, accelerate quickly to merge


M13 - 42  
April 2005

M13

Instructional Topic	Content	Slide
<p>◆ 2. Acceleration Lane (Cont.)</p>	<ul style="list-style-type: none"> <li>• Short acceleration lanes require looking and finding a larger gap in traffic</li> <li>• Try not to stop on an acceleration lane; if it is unavoidable take these precautions:               <ul style="list-style-type: none"> <li>... Flash brake lights to warn drivers behind</li> <li>... Pull to the shoulder at the end of the acceleration lane or merge area</li> <li>... Wait for a large gap, signal, accelerate quickly to merge</li> </ul> </li> </ul>	
<p>— Good Habits Using the Acceleration Lane</p>	<p><u>Good habits include:</u></p> <ul style="list-style-type: none"> <li>• Maintain speed/acceleration</li> <li>• Signal</li> <li>• In the acceleration lane accelerate to the speed of vehicles on the limited access road               <ul style="list-style-type: none"> <li>... Continue to check front and rear zones, mirrors and blind spot</li> <li>... Decide when and where to merge</li> </ul> </li> </ul>	T13-44
<p>— Acceleration Lane Problems</p>	<p><u>Acceleration Lane Problems</u></p> <ul style="list-style-type: none"> <li>• Acceleration lanes can lead to problems due to:               <ul style="list-style-type: none"> <li>... Amount of traffic in lane and on expressway</li> <li>... The acceleration lane is short</li> <li>... Limited space ahead</li> <li>... Actions by drivers ahead and behind</li> </ul> </li> </ul>	T13-45
<p>◆ 3. Merge Lane</p>	<p><u>3. Merge Lane</u></p> <p>Merge lanes provide space to find a gap and move into the lane</p>	T13-46
<p>— Good Habits Merging</p>	<ul style="list-style-type: none"> <li>• Good habits include:               <ul style="list-style-type: none"> <li>... Adjust speed to the traffic flow and for following distance</li> <li>... Check rear zone</li> <li>... Check front zone</li> <li>... Select a safe gap</li> <li>... Signal</li> <li>... Merge smoothly</li> <li>... Cancel signal</li> <li>... Check rear zone again</li> </ul> </li> </ul>	T13-47 T13-48
<p>— Merging Problems</p>	<p><u>Merging Area Problems</u></p> <ul style="list-style-type: none"> <li>• Watch and adjust for the following problems:               <ul style="list-style-type: none"> <li>... Heavy traffic making it difficult to merge</li> <li>... Lack of a gap to merge</li> <li>... Traffic slowing or stopping ahead</li> <li>... Traffic changing lanes at merge</li> </ul> </li> <li>• Allow the driver in front to merge first before merging into traffic</li> </ul>	T13-49

# Student Learning Activities

## Resources



### GOOD HABITS USING THE ACCELERATION LANE

- Maintain speed/acceleration
- Signal
- In the acceleration lane accelerate to the speed of vehicles on the limited access road
- Continue to check front and rear zones, mirrors and blind spot
- Decide when and where to merge

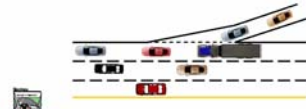


OPI

9111 - 06  
April 1998

### ACCELERATION LANE PROBLEMS

- Acceleration lanes can lead to problems due to:
  - Amount of traffic in lane and on expressway
  - The acceleration lane is short
  - Limited space ahead
  - Actions by drivers ahead and behind

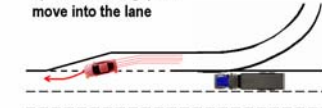


OPI

9111 - 06  
April 1998

### MERGE LANE

Merge lanes provide space to find a gap and move into the lane

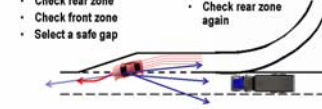


OPI

9111 - 06  
April 1998

### 3. MERGING – GOOD HABITS

- Adjust speed to the traffic flow and for following distance
- Check rear zone
- Check front zone
- Select a safe gap
- Signal
- Merge smoothly
- Cancel signal
- Check rear zone again

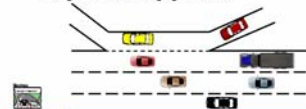


OPI

9111 - 07  
April 1998

### MERGING PROBLEMS

- Watch and adjust for the following problems:
  - Heavy traffic
  - Lack of a gap
  - Traffic slowing or stopping ahead
  - Traffic changing lanes at merge — allow the driver in front to merge first before merging into traffic



OPI

9111 - 08  
April 1998

M13

Instructional Topic	Content	Slide
<p>◆ Weave Lane</p>	<p><u>Weave Lane</u></p> <ul style="list-style-type: none"> <li>• A “weave” lane is both an entrance and an exit lane for drivers</li> <li>• Traffic may come onto and leave the expressway at the same location               <ul style="list-style-type: none"> <li>... This causes conflicts for both drivers using a “weave” lane</li> <li>... Conflicts can occur for drivers on the expressway and on the entrance ramp as they adjust for speed and space</li> </ul> </li> <li>• The driver entering from the entrance ramp should yield the right-of-way to the driver leaving the expressway</li> </ul>	T13-50
<p>—Sharing the Road with Other Drivers</p>	<p>When a driver is entering the entrance ramp make it easier for them by adjusting speed or changing lanes if it is safe to do so</p>	T13-51
<p><b>EXITING A CONTROLLED ACCESS HIGHWAY</b></p>	<p>Introduce, model, practice and discuss</p> <ul style="list-style-type: none"> <li>• As far in advance as possible, identify and know the exit needed</li> <li>• Exits are marked with guide signs, usually one to two miles before the exit</li> <li>• If the exit is missed, do not stop and/or back up on the expressway</li> </ul>	T13-52
<p>◆ Exit Numbering Methods</p>	<p>There are two methods typically used to number exits:</p> <p><u>1. The <i>Consecutive</i> numbering system</u></p> <ul style="list-style-type: none"> <li>... Start at the most westerly or southerly point on each Interstate route, interchanges are numbered consecutively.</li> <li>... Thus the first interchange (exit/entrance) becomes interchange #1</li> <li>... Each succeeding interchange is numbered consecutively as #2, 3, 4, etc., and may also have a letter to indicate two exits for the same interchange that go in the opposite direction</li> </ul> <p><u>2. The <i>Milepost</i> numbering system</u></p> <ul style="list-style-type: none"> <li>... All Interstate routes are mile posted beginning at the most westerly or southerly point</li> <li>... The beginning point is milepost “0”</li> <li>... If the first interchange on the route is located between milepost 4.0 and 5.0, it is numbered as Interchange #4</li> <li>... The next interchange, if located at milepost 8.7, would be numbered as Interchange #8, etc.</li> <li>... With this system the motorist can easily determine the location and distance to a desired interchange.</li> <li>• When at least one-half mile (20-30 seconds) before the exit, signal and move to the lane that leads to the deceleration lane</li> </ul>	<p>T13-52</p> <p>T13-53</p> <p>T13-54</p> <p>T13-55</p>
<p>◆ 1. Deceleration Lane</p>	<p>The exit has two components: (1) deceleration lane, and (2) exit ramp</p> <p><u>1. Deceleration Lane</u></p> <ul style="list-style-type: none"> <li>• This is the area where speed can be reduced to exit safely</li> <li>• Deceleration lanes lead into exit ramps</li> </ul>	T13-56



# Student Learning Activities

# Resources



### TWO COMPONENTS TO EXITING

The exit has two components:

1. Deceleration lane
2. Exit ramp

OPI

### 1. DECELERATION LANE

This is the area where speed can be reduced to exit safely

- Deceleration lanes lead into exit ramps
- Deceleration lanes allow drivers to reduce their speed without blocking traffic on the main part of the limited access highway
- Look for the advisory speed sign for the deceleration lane

OPI

### MERGE WEAVE LANE

- A "weave" lane is both an entrance and an exit lane for drivers
- Traffic may come onto and leave the expressway at the same location
  - Conflicts can occur

The driver entering from the entrance ramp should yield the right-of-way to the driver leaving the expressway

OPI

### SHARE THE ROAD

When a driver is entering the entrance ramp make it easier for them by adjusting speed or changing lanes if it is safe to do so

OPI

### EXITING A CONTROLLED ACCESS ROAD

- As far in advance as possible, identify and know the exit needed
- When at least one-half mile (20-30 seconds) before the exit, signal and move to the lane that leads to the deceleration lane
- Exits are marked with guide signs, usually one to two miles before the exit

If the exit is missed, do not stop and/or back up on the expressway

OPI

### EXIT NUMBERING METHODS

#### 2. The Milepost numbering system

- All Interstate routes are mile posted beginning at the most westerly or southerly point
  - The beginning point is milepost "0"
- If the first interchange on the route is located between milepost 4.0 and 5.0, it is numbered as Interchange No. 4
- The next interchange, if located at milepost 8.7, would be numbered as Interchange No. 8, etc.
- With this system the motorist can easily determine the location they are at and the distance to their destination

OPI

### EXIT NUMBERING METHODS

#### 2. The Milepost numbering system

- All Interstate routes are mile posted beginning at the most westerly or southerly point
  - The beginning point is milepost "0"
- If the first interchange on the route is located between milepost 4.0 and 5.0, it is numbered as Interchange #4
- The next interchange, if located at milepost 8.7, would be numbered as Interchange #8, etc.
- With this system the motorist can easily determine the location and distance

OPI

M13

Instructional Topic	Content	Slide
<p>◆ 1. Deceleration Lane (Cont.)</p> <p>—Good Habits Driving in the Deceleration Lane</p> <p>—Risky Behaviors Driving in the Deceleration Lane</p>	<ul style="list-style-type: none"> <li>Deceleration lanes allow drivers to reduce their speed without blocking traffic on the main part of the limited access highway</li> <li>Look for the advisory speed sign for the deceleration lane</li> </ul> <p><u>Good habits include:</u></p> <ul style="list-style-type: none"> <li>Wait until reaching the deceleration lane before reducing speed</li> <li>At the deceleration lane entrance, perform a smooth lane change procedure and move into the deceleration lane</li> <li>The deceleration lane may be very short requiring a more rapid speed reduction</li> <li>Once in deceleration lane, cancel signal</li> <li>Flash brake lights to warn others</li> <li>Slow and maintain following distance</li> </ul> <p><u>Risky behaviors include:</u></p> <ul style="list-style-type: none"> <li>Failing to see target exit ramp in advance</li> <li>Reducing speed before the deceleration ramp</li> <li>Failing to signal</li> <li>Failing to check rearview mirror</li> <li>Failing to reduce speed on the exit ramp</li> <li>Failing to cancel signal</li> </ul>	<p>T13-57</p> <p>T13-58</p>
<p>◆ 2. Exit Ramp</p>	<p><u>2. Exit Ramp</u></p> <p>Exiting is much easier than entering a limited access roadway</p> <ul style="list-style-type: none"> <li>Signs will guide or warn drivers that the exit is approaching anywhere from five miles to one-fourth mile away from the exit to give drivers plenty of time to move into the proper lane to exit</li> <li>Most exits are on the right, occasionally they are located on the left</li> <li>Identify if the exit is on the left <ul style="list-style-type: none"> <li>... Look for a special yellow EXIT ONLY panel added to the bottom of the freeway guide sign</li> <li>... Look for the position of a small green exit number panel, most are on the right side—if the exit number panel is on the left then the exit will also be on the left side</li> </ul> </li> <li>The exit can be level or sharply curved, or go uphill or downhill</li> <li>There could be two exit lanes leading into a street or highway; the lanes can be restricted to making a right or left turn <ul style="list-style-type: none"> <li>... Move to the lane that will permit entrance to the desired direction</li> </ul> </li> <li>Be prepared for a stop sign or traffic light</li> <li>The line-of-sight could be limited—reduce speed until the line-of-sight is restored</li> </ul>	<p>T13-59</p> <p>T13-60</p>

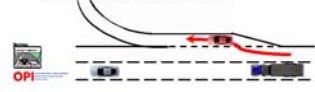
# Student Learning Activities

# Resources



## DECELERATION LANE GOOD HABITS

- Wait until reaching the deceleration lane before reducing speed
- At the deceleration lane entrance, perform a smooth lane change procedure and move into the deceleration lane
- The deceleration lane may be very short requiring a more rapid speed reduction
- Once in deceleration lane, cancel signal
- Flash brake lights to warn others
- Slow and maintain following distance



W13 - 07  
April 2009

## RISKY BEHAVIORS IN THE DECELERATION LANE



- Failing to see target exit ramp in advance
- Reducing speed before the deceleration ramp
- Failing to signal
- Failing to check rearview mirror
- Failing to reduce speed on the exit ramp
- Failing to cancel signal



W13 - 08  
April 2009

## 2. EXIT RAMP

- 2. **Exit Ramp**
- Exiting is much easier than entering a limited access roadway
- Signs will guide or warn drivers that the exit is approaching anywhere from five miles to one-fourth mile away from the exit
- Most exits are on the right, occasionally they are located on the left
- The exit can be level or sharply curved, or go uphill or downhill
- There could be two exit lanes leading into a street or highway; the lanes can be restricted to making a right or left turn



- Move to the lane that will permit entrance to the desired direction
- Be prepared for a stop sign or traffic light



W13 - 09  
April 2009

## 2. EXIT RAMP — Left

- Look for a special yellow **EXIT ONLY** panel added to the bottom of the freeway guide sign
- Look for the position of a small green exit number panel, most are on the right side—if the exit number panel is on the left then the exit will also be on the left side



W13 - 10  
April 2009

M13

Instructional Topic	Content	Slide
—Good Habits Using the Exit Ramp	<u>Good habits include:</u> <ul style="list-style-type: none"> <li>• Check the posted ramp speed sign</li> <li>• Check rear zone</li> <li>• Adjust to or below the posted speed</li> <li>• Check for traffic stopped ahead</li> <li>• Keep a space cushion ahead and behind the vehicle</li> <li>• Watch for “Yield” or “Merge” signs for entering a different roadway</li> <li>• Two lanes may exit at the same time requiring a merge with another lane while on the exit ramp</li> <li>• This can be very dangerous, especially if the ramp is a banked curve</li> <li>• When off the expressway and merged into two-way traffic, check the speedometer frequently and be aware of the effect of velocitation</li> </ul>	T13-61
—Exit Problems	<u>Problems that can occur when exiting include:</u> <ul style="list-style-type: none"> <li>• Traffic backed up on the exit ramp               <ul style="list-style-type: none"> <li>... Enter the line and wait your turn</li> <li>... Go to next exit if possible</li> <li>... Check rear zone and flash brake lights</li> </ul> </li> <li>• Short deceleration lane prior to a sharp curve</li> <li>• Line-of-sight restrictions created by concrete pillars, hills, curves</li> <li>• The same lane is used as both an entrance and exit               <ul style="list-style-type: none"> <li>... Exiting traffic should merge behind entering traffic</li> </ul> </li> </ul>	T13-62
◆ Risky Behaviors Exiting	<u>Risky behaviors include:</u> <ul style="list-style-type: none"> <li>• Speed too slow</li> <li>• Failing to signal</li> <li>• Failing to check traffic to the front and rear</li> <li>• Drifting while checking traffic</li> <li>• Poor gap judgment</li> <li>• Turning the steering wheel too sharply</li> <li>• Failing to cancel signal</li> <li>• Backing up on a freeway or entrance ramp (this is illegal, however, if entering the wrong way it is safer to back up rather than continue going the wrong way into on-coming traffic)</li> </ul>	T13-63
EFFECT OF SPEED ON VISION	Introduce, model, practice and discuss At speeds above 40 mph drivers begin to lose peripheral vision <ul style="list-style-type: none"> <li>• Drivers use peripheral vision to:             <ul style="list-style-type: none"> <li>... See color changes and object movement</li> <li>... See signal changes, approaching road signs, warning lights on the dashboard, potential hazards, and changes in traffic flow</li> <li>... Monitor traffic flow</li> <li>... Stay within the lane when the driver is distracted</li> <li>... Give the driver an initial warning of a changing or closed zone</li> </ul> </li> </ul>	T13-64

# Student Learning Activities

# Resources



## EXIT RAMP GOOD HABITS

- Check the posted ramp speed sign
- Check rear zone
- Adjust to or below the posted speed
- Check for traffic stopped ahead
- Keep a space cushion ahead and behind the vehicle
- Watch for "Yield" or "Merge" signs for entering a different roadway
- Two lanes may exit at the same time requiring a merge with another lane while on the exit ramp
- When off the expressway and merged into two-way traffic, check the speedometer and be aware of the effect of velocity


0111 - 01  
April 2009

## EXIT PROBLEMS

- Traffic backed up on the exit ramp
- Short deceleration lane prior to a sharp curve
- Line-of-sight restrictions created by concrete pillars, hills, curves
- The same lane is used as both an entrance and exit
- Exiting traffic should merge behind entering traffic


0111 - 02  
April 2009

## RISKY BEHAVIORS – Exiting

- Speed too slow
- Failing to signal
- Failing to check traffic to the front and rear
- Drifting while checking traffic
- Poor gap judgment
- Turning the steering wheel too sharply
- Failing to cancel signal
- Backing up on a freeway or entrance ramp


0111 - 03  
April 2009

## EFFECT OF SPEED ON VISION

- At speeds above 40 mph drivers begin to lose peripheral vision
- Peripheral vision is needed to:
  - See color changes and object movement
  - See signal changes, approaching road signs, warning lights on the dashboard, potential hazards, and changes in traffic flow
  - Monitor traffic flow
  - Stay within the lane when the driver is distracted
  - Give the driver an initial warning of a changing or closed zone


0111 - 04  
April 2009

M13

Instructional Topic	Content	Slide
EFFECT OF SPEED ON VISION (Cont.)	<ul style="list-style-type: none"> <li>• As speed increases, the amount of information needed to maintain car position and detect movement also increases</li> <li>• Drivers have less time to see and make decisions               <ul style="list-style-type: none"> <li>... Peripheral vision (used to detect the motion of other objects) becomes blurred and distorted</li> <li>... Results in tunnel vision, where the eyes become focused on what is directly ahead</li> <li>... Even minor changes to lane position occur quickly which causes significant or exaggerated vehicle movements</li> </ul> </li> <li>• As speed increases, drivers need more time to gather information by extending central vision to the target area               <ul style="list-style-type: none"> <li>... Increase visual search to detect motion farther away from the vehicle in order to give time for adequate response</li> <li>... Allow for more space between other vehicles so abrupt responses are held to a minimum</li> </ul> </li> <li>• Peripheral vision is reduced significantly as speed increases               <ul style="list-style-type: none"> <li>... 25 percent ineffective at 30 mph</li> <li>... 50 percent ineffective at 50 mph</li> <li>... 90 percent ineffective at 70 mph</li> <li>... Ineffective at 90 mph or above</li> </ul> </li> </ul>	<p>T13-65</p> <p>T13-66</p>
LANE CHANGES AND PASSING	<p>Introduce, model, practice and discuss</p> <p>Lane choice is dependent upon several factors:</p> <ul style="list-style-type: none"> <li>• Volume of traffic</li> <li>• Type of traffic</li> <li>• Blocked lane</li> <li>• Speed</li> <li>• Planned exit</li> </ul>	T13-67
◆ Right Lane	<p>The far right lane has potential for conflicts with drivers entering and leaving the expressway</p> <ul style="list-style-type: none"> <li>• Avoid the far right lane until preparing to exit since this lane may be an exit only lane</li> <li>• There will also be more traffic merging in the far right lane which increases the risk for collision</li> <li>• On some limited access highways trucks and heavy vehicles are restricted to using the far right lane</li> </ul>	T13-68
◆ Center Lane	<p>The center and/or far left lane is reserved for passing and high speed through traffic</p>	T13-69
◆ Far Left Lane	<p>In heavy traffic, sometimes the left lanes have the smoothest flow</p> <ul style="list-style-type: none"> <li>• Occasionally the left lane(s) may have exiting and entering traffic</li> </ul>	

# Student Learning Activities

# Resources



## EFFECT OF SPEED ON VISION

- As speed increases, the amount of information needed to maintain car position and detect movement also increases
- Drivers have less time to see and make decisions
- Peripheral vision (used to detect the motion of other objects) becomes blurred and distorted, resulting in tunnel vision
- Even minor changes to lane position occur quickly which causes significant or exaggerated vehicle movements



9111 - 85  
April 1999

## EFFECT OF SPEED ON VISION

- As speed increases, drivers need more time to gather information by extending central vision to the target area
- Increase visual search to detect motion farther away from the vehicle in order to give time for adequate response
- Allow for more space between other vehicles so abrupt responses are held to a minimum
- Peripheral vision is reduced significantly as speed increases
- 25 percent ineffective at 30 mph
- 50 percent ineffective at 50 mph
- 90 percent ineffective at 70 mph
- Ineffective at 90 mph or above



9111 - 86  
April 1999

## LANE CHOICES

Lane choice is dependent upon several factors

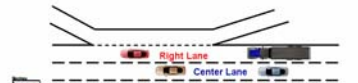
- Volume of traffic
- Speed
- Type of traffic
- Planned exit
- Blocked lane



9111 - 87  
April 1999

## LANE CHOICES - Far Right Lane

- The far right lane has potential for conflicts with drivers entering and leaving the expressway - avoid until preparing to exit
- Traffic merging increases the risk for collision
- On some limited access highways, trucks and heavy vehicles are restricted to using only the far right lane



9111 - 88  
April 1999

## LANE CHOICES

- Center Lane
  - The center and/or far left lane is reserved for passing and high speed through traffic
- Left Lane
  - In heavy traffic, sometimes the left lanes have the smoothest flow
  - Occasionally the left lane(s) may have exiting and entering traffic



9111 - 89  
April 1999

M13

Instructional Topic	Content	Slide
◆ Six or More Lanes	<ul style="list-style-type: none"> <li>In general, drive in the center lane(s) to avoid conflict with merging and exiting traffic</li> <li>... This allows passing lanes to the left</li> </ul>	T13-70
◆ Lane Changes	<p>The need to change lanes on the expressway occurs often</p> <ul style="list-style-type: none"> <li>A lane change can be more risky when there are more than two lanes going in the same direction because several drivers may want to move into the same lane at the same time</li> <li>Some reasons for changing lanes on the expressway include:               <ul style="list-style-type: none"> <li>... Entering or exiting</li> <li>... Changing lanes to allow someone else to enter</li> <li>... Following large or slow-moving vehicles</li> <li>... Lane ahead becomes blocked</li> <li>... Passing</li> </ul> </li> </ul>	T13-71
—Good Habits for a Lane Change	<p>Good habits include:</p> <ul style="list-style-type: none"> <li>Check traffic (mirrors and head check)</li> <li>Look for drivers wanting to enter the same lane</li> <li>Signal</li> <li>If clear, steer smoothly to the new lane (if not, wait)</li> <li>Cancel signal</li> <li>Change one lane at a time; do not cross several lanes at once</li> <li>Adjust speed to the flow of traffic in the new lane</li> </ul>	T13-72
◆ Passing	<p>Passing is one of the most dangerous maneuvers a driver can attempt</p> <ul style="list-style-type: none"> <li>Drivers often compete for the same space</li> <li>High speed passing adds to the danger</li> <li>High volume of traffic increases the chance of collisions</li> <li>Evaluate gain versus risk prior to attempting a passing maneuver               <ul style="list-style-type: none"> <li>... Check all zones for line-of-sight and path-of-travel (LOP-POT) conditions</li> </ul> </li> </ul>	T13-73
	<p>Passing may occur on the left or right</p> <ul style="list-style-type: none"> <li>... Control speed and lane position</li> <li>... Identify tailgater problems early</li> <li>... Pass on the left if possible</li> <li>... Occasionally drivers may have to pass on the right if there is someone driving slow in the wrong lane</li> <li>... If being passed on the right the vehicle may be going slower than the speed limit—move to the right lane and let faster-moving traffic continue on</li> </ul>	T13-74



# Student Learning Activities

# Resources



## MULTIPLE LANES

- In general, drive in the center lane(s) to avoid conflict with merging and exiting traffic
- This allows passing vehicles to use the left lane



OPI

M13 - 11

## LANE CHANGES

- A lane change can be more risky when there are more than two lanes going in the same direction because several drivers may want to move into the same lane at the same time



OPI

M13 - 11

## LANE CHANGES

Good habits include:



- Check traffic (mirrors and head check)
- Look for drivers wanting to enter the same lane
- Signal
- If clear, steer smoothly to the new lane (if not, wait) and cancel signal
- Change one lane at a time; do not cross several lanes at once
- Adjust speed to the flow of traffic in the new lane

OPI

M13 - 12

## PASSING

- Passing is one of the most dangerous maneuvers a driver can attempt
- High speed passing adds to the danger
- High volume of traffic increases the chance of collisions
- Evaluate gain versus risk prior to attempting a passing maneuver
- Check all zones for line-of-sight and path-of-travel (LOP-POT) conditions



These vehicles are traveling at the maximum speed limit (75 mph) - what would cause the driver of the white car to tailgate the red truck?

OPI

M13 - 13

## PASSING

- Passing can be on the left or right
- Identify tailgater problems early
- Pass on the left if possible



OPI

M13 - 14

M13

Instructional Topic	Content	Slide
<p>◆ Passing (Cont.)</p> <p>—Good Habits for Passing</p> <p>—Risky Behaviors When Passing</p>	<ul style="list-style-type: none"> <li>When changing lanes, change one lane at a time ... Do not cross several lanes at once</li> <li>Adjust speed to the flow of traffic once in the new lane</li> </ul> <p>See Module 7, page 30 for <i>Good Habits for Passing</i></p> <p>See Module 7, page 32 for <i>Risky Behaviors When Passing</i></p>	<p>T13-75</p>
<div>MANAGING TIME AND SPACE</div>	<p>Introduce, model, practice and discuss</p> <p>Limited access highways typically have long distances that drivers can see making it easier to see possible hazards long before they are reached</p> <ul style="list-style-type: none"> <li>Driving at the speed of traffic is the best way to establish and maintain safe space around the vehicle ... Avoid exceeding the legal posted speed limit</li> <li>Adjust the vehicle's position and speed to road and weather conditions in order to provide time for braking, accelerating, and steering</li> <li>When another driver tailgates, it is safer to change lanes while keeping an adequate distance to the front of the vehicle</li> <li>Reduce speed when the roadway narrows at tunnels, construction zones, and for larger vehicles</li> <li>Be alert for crosswinds when driving over bridges or through open mountain passes</li> <li>"Wolf packs" are groups of drivers traveling together at higher speeds; they can be seen approaching from the rear at a rapid pace, each attempting to get ahead of the other vehicles ... Avoid "wolf packs" by driving in the right lane and allowing the pack of drivers to pass and move away</li> </ul>	<p>T13-76</p> <p>T13-77</p> <p>T13-78</p>
<p>◆ Following Distance</p>	<p>Following too closely is a primary cause of traffic collisions among all drivers in Montana and the nation</p> <ul style="list-style-type: none"> <li>Following distance is critical on the expressway ... Time is needed to react to danger to avoid a collision</li> </ul> <p>Adequate following distance has many advantages:</p> <ul style="list-style-type: none"> <li>More time to adjust to traffic conditions</li> <li>Reduced surprises requiring quick maneuvers</li> <li>More space in which to maneuver</li> <li>Control of the front space</li> </ul>	<p>T13-79</p>

# Student Learning Activities

# Resources



## PASSING

- Occasionally drivers may have to pass on the right if there is a slow driver in the wrong lane
- If you are being passed on the right you may be going slower than the speed limit—move to the right lane and let faster-moving traffic continue on


M13 - 16  
Sept 2009

## MANAGING TIME AND SPACE

- Limited access highways typically have long distances that drivers can see making it easier to see possible hazards long before they are reached
- Driving at the speed of traffic is the best way to establish and maintain safe space around the vehicle
  - Avoid exceeding the legal posted speed limit


M13 - 18  
Sept 2009

## MANAGING TIME AND SPACE

- Adjust the vehicle's position and speed to road and weather conditions
- When another driver tailgates, it is safer to change lanes
- Reduce speed when the roadway narrows at tunnels, construction zones, and for larger vehicles
- Be alert for crosswinds when driving over bridges or through open mountain passes, or passing large trucks


M13 - 17  
Sept 2009

## MANAGING TIME AND SPACE

- "Wolf packs" are groups of drivers traveling together at higher speeds; they can be seen approaching from the rear at a rapid pace, each attempting to get ahead of the other vehicles
- Avoid "wolf packs" by driving in the right lane and allowing the pack of drivers to pass and move away



A "wolf pack" is approaching from the rear, what action would you take?


M13 - 18  
Sept 2009

## FOLLOWING DISTANCE

- Following too closely is a primary cause of traffic collisions among all drivers in Montana and the nation
- Following distance is critical on the expressway
  - Time is needed to react to danger to avoid a collision



You are the driver and this is what you see  
Describe your front zones and any actions you have already taken and any actions you will now take.


M13 - 19  
Sept 2009

M13

Instructional Topic	Content	Slide
<p>◆ Following Distance (Cont.)</p>	<ul style="list-style-type: none"> <li>• Drivers have the most control over the space directly in front of the vehicle               <ul style="list-style-type: none"> <li>... Reduce risk by creating as much space as possible</li> <li>... Have a goal to maintain a minimum 3-4 second following distance when driving conditions are good</li> <li>... Keeping an open area to at least one side of the vehicle gives the driver an escape route if the lane ahead becomes blocked</li> <li>... Maintain at least a 3-4 second space to the rear of the vehicle by controlling space to the front; sometimes in heavy congestion, drivers must continue to work toward 3-4 seconds of space in front as much as possible</li> </ul> </li> </ul>	T13-80
	<ul style="list-style-type: none"> <li>• At highway speeds even a three second following distance is inadequate when braking to a stop to avoid striking a fixed object if the vehicle following behind is a tractor trailer rig               <ul style="list-style-type: none"> <li>... In such instances a stopping zone of 10 to 15 seconds may be required</li> <li>... The larger the vehicle in front the more distance needed</li> <li>... When following trucks, move to a lane position that allows the driver of the truck to see the vehicle</li> <li>... Stay out of the "NO ZONE" areas</li> </ul> </li> </ul>	T13-81
	<ul style="list-style-type: none"> <li>• Increase following distance when following large trucks or buses, motorcycles, driving in bad weather, being tailgated, and entering/exiting the expressway               <ul style="list-style-type: none"> <li>... Get the best lane position for the best line of sight</li> <li>... Identify an alternate path (an open area to at least one side, 12 to 15 seconds ahead) into which the vehicle can be steered and safely brake to a stop</li> </ul> </li> <li>• Under conditions where there is no alternate path into which the vehicle can be steered, the only option is to reduce speed and increase following distance</li> <li>• Anytime a driver moves into an area of reduced space with a vehicle tailgating, it is essential to reduce speed earlier               <ul style="list-style-type: none"> <li>... Slowing earlier and tapping the brakes to alert the following driver provides greater control over the vehicle to the rear</li> </ul> </li> <li>• When weather conditions reduce visibility or traction, SLOW down</li> <li>• As speed increases, the following distance automatically increases while maintaining the same following time</li> <li>• Develop a minimal 3-4 second following distance when merging onto the roadway, changing lanes, and exiting</li> </ul>	T13-82

# Student Learning Activities

# Resources



## FOLLOWING DISTANCE

- Drivers have the most control over the space directly in front of the vehicle



0113 - 00  
April 1999

## FOLLOWING DISTANCE

- At highway speeds even a three second following distance is inadequate
- The larger the vehicle in front the more distance needed
- When following trucks, move to a lane position that allows the driver of the truck to see the vehicle



- These vehicles are traveling over 70 mph
- Describe the conditions in the front zone



0113 - 01  
April 1999

## FOLLOWING DISTANCE

- Increase following distance when following large trucks or buses, motorcycles, driving in bad weather, being tailgated, and entering/exiting the expressway
- Get the best lane position for the best line of sight
- Identify an alternate path (an open area to at least one side, 12 to 15 seconds ahead) into which the vehicle can be steered and safely brake to a stop



0113 - 02  
April 1999

M13

Instructional Topic	Content	Slide
<p>◆ Following Distance (Cont.)</p>	<p>Use good habits for vision control by searching for:</p> <ul style="list-style-type: none"> <li>• Signs, signals and markings</li> <li>• Heavy traffic</li> <li>• Lanes with heavier traffic</li> <li>• Exit and merge lanes</li> <li>• Closed lanes and zones</li> <li>• Brake lights</li> <li>• Speeders</li> <li>• Constant lane changers</li> <li>• Tailgaters</li> <li>• Cars suddenly stopping</li> <li>• Sudden changes in traffic flow</li> <li>• Drivers changing lanes</li> <li>• Movement of vehicles parked on side of roadway</li> </ul> <p>Develop good habits for motion and steering control by:</p> <ul style="list-style-type: none"> <li>• Using minimal steering inputs during higher speeds to change lanes when passing, entering, or exiting</li> <li>• Excessive steering can lead to a loss of control at higher speeds</li> <li>• Avoiding sudden moves</li> <li>• Recognizing how higher speeds demand quicker decisions</li> <li>• Avoiding last minute decisions or indecision</li> <li>• Signaling for every maneuver</li> <li>• Moving smoothly</li> </ul>	<p>T13-83</p> <p>T13-84</p>
<p>◆ Disabled Vehicle</p>	<p>Parking on an Interstate is prohibited except in an emergency when the vehicle has been disabled and can't be moved to the next exit</p> <ul style="list-style-type: none"> <li>• When a driver has a disabled vehicle: <ul style="list-style-type: none"> <li>... Pull off as far as possible onto the shoulder or median</li> <li>... If it is not possible to get far off the roadway, get passengers out and away from the vehicle</li> <li>... Turn on emergency/hazard flashers</li> <li>... When safe, raise the car's hood and tie a white cloth to the antenna and/or door handle</li> <li>... Set emergency flares 100-500 feet behind vehicle</li> <li>... Stay in the vehicle and lock doors</li> <li>... Ask anyone who stops to telephone for assistance</li> <li>... Do not get into a stranger's vehicle</li> </ul> </li> <li>• When a disabled vehicle is seen ahead, reduce speed and increase the space away from the disabled vehicle <ul style="list-style-type: none"> <li>... This may require changing lanes</li> <li>... Be alert for pedestrians, tow trucks, and/or police vehicles</li> </ul> </li> </ul>	<p>T13-85</p>

# Student Learning Activities

# Resources



## FOLLOWING DISTANCE

Use good habits for vision control by searching for:

- Signs, signals and markings
- Heavy traffic
- Lanes with heavier traffic
- Exit and merge lanes
- Closed lanes and zones
- Brake lights
- Speeders
- Constant lane changers
- Tailgaters



- Cars suddenly stopping
- Sudden changes in traffic flow
- Drivers changing lanes
- Movement of vehicles parked on side of roadway



M13 - 03  
April 1993

## Develop Good Habits for Motion and Steering Control



- Use minimal steering inputs to change lanes when passing, entering, or exiting
- Recognize how excessive steering can lead to a loss of control at higher speeds
- Avoid sudden moves
- Recognize how higher speeds demand quicker decisions
- Avoid last minute decisions or indecision
- Signal for every maneuver
- Move smoothly



M13 - 04  
April 1993

## DISABLED VEHICLE

Parking on an Interstate is prohibited except in an emergency when the vehicle has been disabled and can't be moved to the next exit

Describe the safe behaviors drivers should take if their vehicle becomes disabled



M13 - 06  
April 1993

**M13**

Instructional Topic	Content	Slide
RESPONDING TO CONGESTION	<p>Introduce, model, practice and discuss</p> <p>Do not go blindly onto a limited access highway without checking for traffic conditions</p> <ul style="list-style-type: none"> <li>• Driving in congested traffic can be frustrating and significantly increase commute time</li> <li>• If traffic is crawling or stopped, take a different route</li> <li>• To avoid congestion, especially during rush hour traffic:               <ul style="list-style-type: none"> <li>... Leaving 6 1/2 minutes earlier could make all the difference in an average 32-minute commute</li> <li>... Check radio and television stations that routinely offer traffic reports</li> <li>... Obtain a detailed community street map and plan alternate routes</li> <li>... If already on a congested route, exit at the first opportunity</li> </ul> </li> <li>• Congested highways can lead to multiple crashes involving dozens of vehicles that can close down highways for hours</li> <li>• Technology now offer Global Positioning System (GPS) that can help drivers locate alternative routes               <ul style="list-style-type: none"> <li>... More affordable systems include satellite telephones with streaming real time traffic reports (available in select locations) and downloadable maps to cellular phones</li> </ul> </li> </ul>	<p>T13-86</p> <p>T13-87</p>
RISKY BEHAVIORS ON CONTROLLED ACCESS HIGHWAYS	<p>Risky behaviors when driving on limited access highways include:</p> <ul style="list-style-type: none"> <li>• Driving over or across median, yellow painted line, or raised dividing section</li> <li>• Making a left turn or a U-turn</li> <li>• Using the left lane exclusively</li> <li>• Changing lanes without signaling and checking for an open gap</li> <li>• Driving onto the freeway except through an on-ramp</li> <li>• Parking or stopping on the freeway, except at areas provided</li> <li>• Parking on shoulder in an emergency</li> <li>• Backing up</li> <li>• Failing to wear a seat belt</li> </ul>	T13-88
ASSIGNMENT		
ASSESSMENT		



# Student Learning Activities

# Resources



## RESPONDING TO CONGESTION

- Do not go blindly onto a limited access highway without checking for traffic conditions



What actions can drivers take to avoid congested conditions such as this one?



8113 - 06  
April 1998

## RESPONDING TO CONGESTION

- Technology now offers a Global Positioning System (GPS) that can help drivers locate alternative routes
- More affordable systems include satellite telephones with streaming real time traffic reports and downloadable maps to cellular telephones



8113 - 07  
April 1998

## RISKY BEHAVIORS WHEN DRIVING ON CONTROLLED ACCESS HIGHWAYS



- Driving over or across median, yellow painted line, or raised dividing section
- Making a left turn or a U-turn
- Using the left lane exclusively
- Changing lanes without signaling and checking for an open gap
- Driving onto the freeway without taking an on-ramp
- Parking or stopping on the freeway, except at areas provided
- Parking on shoulder in an emergency
- Backing up
- Failing to wear a seat belt



8113 - 08  
April 1998

**M13**